Promoting Environmental Values through Science Process Skill Based Activities

R. Ramnath and P. Sivakumar

Department of Education, Alagappa University, Karaikudi, Tamil Nadu, India.

Department of Education, DDE, Alagappa University, Karaikudi, Tamil Nadu, India.

E-mail: rrnathedn@yahoo.co.in, psksiva2002@yahoo.co.in

Abstract – **Apart from the knowledge and attitudes, there is one more part of science i.e. science process skills. Children should not learn mear the concepts, should learn how to learn by thinking critically and using information creatively. Once the mind administered in the process in turn it yields automatically the product. In this context ,it has been analyzed that instead of the environmental values have been inculcating through school curricula in the form of knowledge, it must be imparted through the compulsory activities as supplementary to the science subject by means of the process skills such as observing, classifying, communicating, measuring, estimating, reasoning, predicting, inferring, identifying, controlling variables, defining operationally, hypothesizing, experimenting, graphing, interpreting, modelling and investigation as per the level of the students. The samples of 50 students of IX standard from Alagappa Model Higher Secondary school, Karaikudi were adapted to the present study by random sampling technique. The single group design has been employed to conduct an experiment with the above science process skills. The performance scale, questionnaire for environmental values and reaction scales were used as the tool for the present study, through the data also been collected. The results from analyzed data showed that there was an excellent realization of the values of students on environmental issues rather that their realization of values acquired through advance organiser. The science process skill based activities evident that it would help us to inculcate the environmental values stronger, retain longer and ever.**

Keywords: **Science Process Skill, Environmental Values, Advance Organizer, Curriculum**

I. Introduction

Science as an enterprise has individual, social and institutional dimensions. It is fundamentally a means of understanding why things happen as they do. Man has found science as a process by which his search for answers to his ultimate questions can be approached systematically. In the way the study of science is an intellectual and social endeavour. The application of human intelligence in figuring out how the world works should have a prominent place in any curriculum that has science literacy as one of its aims. Ganguly (1978) identified the identified the process approach as one of the core element of the course and in order to fulfil the objectives of the course. A process approach can influence brain, heart and hand of the learners (Bhargave, P.M. 1977).

There are a number of ways of conceiving of the meaning of the "Processes of Science". The first implied by the American Association for the advancement of science (John R, Mayar, 1962-68), in their programme Science A Process Approach (SAPA), is a corresponding de-emphasis on specific science "Content". A second meaning of process, referred to by Gagne (1966) canters upon the idea that what is taught to children should resemble, what scientists do the "Processes" that they carry out in their own scientific activities. The third and perhaps most widely important meaning of process introduce the consideration of human intellectual development. From this point of view, processes are in a broad sense "Ways of processing information" such processing grows more complex as the individual develops from early childhood on ward. The individual capabilities that are developed may reasonably be called "Intellectual Skills", or "Process".

The process of science includes scientific attitudes and methods of enquiry. The scientific attitude may be in the mode of emotional attitude and intellectual attitude. The methods of enquiry nothing but the process skills evolve in science learning. The learner's scientific attitudes develop simultaneously with science process skill development.

II. Cram For The Study

When learner asked to do something compulsorily with in their capacity, it would be conditioned in him/her in future. The compulsory science process skill based activities on environmental education could be brought a sea change in the values of trainees and students. The Rainwater harvesting scheme made a great impact on every citizens of Tamilnadu

because of its compulsory programme nature. The NSS and NCC programmes enrolment by the students is for the sake of their marks or credits mainly rather than other purpose. The compulsory science process skill based activities may help them to realize the values of environmental education longer.

The major objective of the study is to promote Environmental values through Science process skill based activities.

III. Methodology

The single group experimental design was adapted to the present study.A sample of 50 IX standard students of Alagappa Model Higher Secondary School, Karaikudi were selected by adopting random sampling technique. The sample includes both boys and girls. Performance scale, Reaction scale and questionnaire of environmental values were the tools that administered in the present study to scale the process skills and willingness of the students respectively.

Procedure

The experimentation has been conducted for three weeks. The first week begins with the presentation of Advance organiser as suggested by Ausubel (1963). It is a hieriatically organised set of ideas that provides anchors for the new information and ideas, as these are received, and that serves, as storehouse for ideas. The performance of the students and values are assessed at the end of advance organiser programme.

Based on the Science Process skills a number of activities which triggers environmental values are developed. These activities may incorporate one or more science process skills. During the second phase the above developed activities are administered. For instance… filter the cigarette smoke, rubber (tyre) burning smoke and vehicle smoke on the white cotton cloth for observing and analysing. Collecting and comparing the soil from industrial and non-industrial (Agricultural) areas, and dry land and wet land, etc. The performance of the students and their values are assessed at the end of activities too. The difference between the values of both the advance organiser and the science process skill based activities is found based on the samples' response to the reaction scale and performance scale is discussed below. The students' values through questionnaire are also assessed and compared.

Iv. Results

Hypothesis 1

There exist significant difference between the mean scores of students' reaction to the Advance organiser and science process skill based activities.

The Table I shows the difference between the mean scores of Advance organiser and process skill based activities in reaction scale of the total sample.

The mean score of science process skill based activities is 25.24 and SD is 5.24 which are higher than the values of Advance Organiser. Since the calculated 't' - value (18.21) is higher than the table value (1.96) at 0.01 level, it is inferred that there is significant difference between the reactions of the students to the advance organizer and science process skill based activities. Hence, the hypothesis framed by the investigators is accepted.

Hypothesis 2

There exist significant difference between the performance of students in advance organiser and science process skill based activities.

The performance of the students is higher through science process skill based activities than advance organiser in all the dimensions of performance except open mindedness. Hence, it is inferred that the science process skill based activities helped students to improve their performance in realising environmental values. Since there exist significant difference between advance organiser and science process skill based activities, the hypothesis framed by the investigators is accepted in all the dimensions except open mindedness.

Hypothesis 3

There exist significant difference between the environmental values obtained by the students through advance organiser and science process skill based activities.

Since there exist difference between the mean scores of advance organiser and Science Process Skill based activities in the environmental values of the students, it is inferred that the science process skill based activities enhanced environment values better than the advance organiser.

TABLE I MEAN SCORE OF REACTION SCALE OF THE ADVANCE ORGANIZER AND SCIENCE PROCESS SKILL BASED ACTIVITIES

S.No.	Programme	N	Mean	S.D	't' – Value	Level of Significance
1	Advance organiser	50	12.72	3.58	18.214	Significant
2	Science Process skill based activities	50	25.24	5.24		

Significant at 0.01 Level.

TABLE II DIFFERENCE BETWEEN THE MEAN SCORES OF STUDENTS' VALUES & PERFORMANCE IN ADVANCE ORGANISER AND SCIENCE PROCESS SKILL BASED ACTIVITIES

Dimension of the performance	Stage	N	Mean	SD	't' – Value	Level for significance
Objectivity	Advance organiser	50	12.72	2.25	4.21	Significant
	Science process skill based activities		22.50	2.09		
Curiosity	Advance organiser	50	12.86	1.51	5.06	Significant
	Science process skill based activities		20.17	3.01		
Open-mindedness	Advance organiser	50	16.81	1.28	0.91	Not Significant
	Science process skill based activities		24.03	1.00		
Rationality	Advance organiser	50	13.39	1.40	5.03	Significant
	Science process skill based activities		25.97	2.30		
Free from superstitions	Advance organiser	50	12.39	1.30	5.48	Significant
	Science process skill based activities		24.75	3.91		
Willingness to suspend judgement	Advance organiser	50	11.97	0.71	3.57	Significant
	Science process skill based activities		26.75	2.01		
Perseverance	Advance organiser	50	13.64	0.96	3.83	Significant
	Science process skill based activities		20.31	2.47		

Significant at 0.01 Level.

TABLE III DIFFERENCE BETWEEN THE VALUES OF STUDENTS IN THE I PHASE TEST AND II PHASE TEST

S.No.	Test	N	Mean	SD	't' – Value	Level for significance
1	I phase Test (from Advance organizer)	50	22.49	4.92	4.46	Significant
2	II phase test (from science process skill based activities)	50	26.59	4.35		

Significant At 0.01 Level.

Educational Implications

The results of the present investigation have very significant value in the field of science education and potential value furthering our understanding of learning behaviour in science. Process approach in science education can be applied for the vitalization and improvement. This also has an implication on the curriculum development standard setting, vitalising instruction, class room teaching, development of resource materials, etc.

V. FINDINGS

Moreover, the finding indicates that the science process skill based activities excel than the advance organiser in promoting environmental values of the students. In each dimension, the values and performance of the students are more in the science process skill based activities except the dimension (i.e.) open-minded. The internalizing of the values among students was also easier through science process skill

based activities than advance organiser. Since, the values are inculcated through process skill based activities there may be possibilities to retain the values longer, even permanently.

VI. Conclusion

Science process is not just useful in science, but in any situation that requires critical thinking. Science process skills include observing qualities, measuring quantities, sorting/classifying, inferring, predicting, experimenting, and communicating. In Pavlov's classical conditioning experiment, he has also emphasised the importance of the activities in retaining the things what learnt. The activity based learning helps for any habitual formation results into the values. Since the science process skill based activities applied in this present investigation possess all the above stated components it can be used to promote the environmental values of the students.

References

[1]   E. Van Glaser feld, "An introduction to Radical Constructivism," Watzlanick (Ed) Newyork, pp. 173-177, 1984.

[2]   UNESCO, "Handbook of science Teachers," U.K.Page Bros, pp.81-86, 1980.

[3]   N. Vidhya, "Science Teaching for 21st Century," Deep & Deep publications, New Delhi, 1996.

[4]   Hall," New Delhi, 1968.

[5]   K. Sri Devi, "Constructivism in science Education," DPH, New Delhi, pp.9-12, 2008.

[6]   P. Sivakumar and R. Krishnaraj, "Information Processing Models of teaching theory & Research," Neelkamal Publication, Hydrabad, pp. 79, 2005.

[7]   P. M. Bhargave, 1977 John R. Mayar, 1962-68 and Gagne (1966) are quoted by P. C. Bhatt, "Science Process skills in Teaching and Learning," Common Wealth Publication, New Delhi, 2005. pp. 7-8. 1977

[8]   R. Ramnath and P. Sivakumar, "Constructivism based learning strategy in enhancing the science process skills of the students of secondary schooling," *Research and Reflections of Education,* Vol. 09, No. 02, pp. 8-21, June 2011.

[9]   P. Sivakumar and R. Ramnath, "Science process skills of the IX standard students: An evaluative study," *Endeavours in Education,* Vol. 2, No. 2, pp. 70-76, June 2011.

[10] R. Ramnath and P. Sivakumar, "Constructivism and skill based pedagogy in the Higher educational context," *Indian journal of Applied research,* Vol. 1, No. 3, pp. 61-62, Dec. 2011.

[11] B. B. Ganguly, "Experience in developing instructional materials for integrated science curriculum, " UNESCO Regional Office for Education in Asia and Ocenta Publication, Bangkok, 1978.